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ELASTIC NEUTRON SCATTERING AT 96 MeV

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A facility for detection of scattered neutrons in the energy interval 50-130 MeV, SCANDAL (SCattered Nucleon Detection AssembLy), has recently been installed at the 20-180 MeV neutron beam line of the The Svedberg Laboratory, Uppsala. Elastic neutron scattering from <sup>12</sup>C, <sup>56</sup>Fe, <sup>89</sup>Y and <sup>208</sup>Pb has been studied at 96 MeV in the 10-70° interval. The results from <sup>12</sup>C and <sup>208</sup>Pb have recently been published, while the data from <sup>56</sup>Fe and <sup>89</sup>Y are under analysis and will be presented at the conference. The achieved energy resolution, 3.7 MeV, is about an order of magnitude better than for any previous experiment above 65 MeV incident energy. The present experiment represents the highest neutron energy where the ground state has been resolved from the first excited state in neutron scattering. A novel method for normalization of the absolute scale of the cross section has been used. The estimated normalization uncertainty, 3 %, is unprecedented for a high-energy neutron-induced differential cross section measurement on a nuclear target. The results are compared with modern optical model predictions, based on phenomenology or microscopic nuclear theory. Applications for these measurements are within nuclear waste incineration, single event upsets in electronics and fast-neutron cancer therapy.